

UNIVERSITY OF CALIFORNIA, LOS ANGELES

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Semi-annual status report for NASA grant NsG-313-63/05-007-005

1. Rb-Sr measurements on individual chondrules.

Work done under this grant has shown that the most recent Rb-Sr equilibration of the chondrules in the stone meteorite Bjurböle occurred $4.3 \pm 0.5 \times 10^9$ years ago. Very recently Dodd and Van Schmus have shown that the homogenization of the olivine and pyroxenes between chondrules was the result of equilibration in situ rather than predating the aggregation of chondrule and matrix material as proposed by Fredriksson and Keil following their discovery of this homogeneity. This implies that the Rb-Sr equilibration time indicated by our investigations represents a significant metamorphic event in the post-equilibration history of the chondrites and their parent body. Accordingly it is of considerable importance to date this event more accurately. We have been trying to do this but in spite of considerable effort, our previous techniques have not provided sufficiently low or reproducible levels of Rb and Sr contamination to permit this. This problem arises because of the small sample sizes together with the low concentration of Rb and Sr in the chondrules.

We are now making a further effort to achieve this improvement in accuracy by remodeling our laboratory (using University funds) in a number of ways to make it as free as possible of airborne contamination and by further purification of the reagents employed. This work is nearing completion and the problem of the Rb-Sr equilibration time of the chondrules will be restudied shortly.

2. Half-life of Rb⁸⁷.

As described previously we are trying to measure the half-life of Rb⁸⁷ by accumulation and accurate measurement of the radiogenic Sr daughter in the laboratory. There are a number of serious difficulties in this experiment which have not yet been overcome and it may actually not be possible to overcome them. Nevertheless this experiment is probably the only way to avoid the difficulties encountered in a counting experiment which leaves us with an uncertainty of about $\pm 5\%$ in the value of this half-life. This error is the most significant source of error in understanding the relationship between the age of the earth and of the meteorites as obtained from different decay schemes.

At present we are trying to obtain a rubidium sample of sufficiently high purity ($< 0.02 \mu\text{g Sr/Kg of Rb}$). By use of various coprecipitants we have reduced the Sr concentration of commercially-obtained Rb salts to $5 \mu\text{g/Kg}$ and are currently trying various ways to improve this still further.

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page 2. Semi-annual status report for NASA grant NsG-313-63/05-007-005

3. Neutron activation analysis of trace elements in iron meteorites.

Together with several students I am ⁱⁿjoining Professor Wasson in a study of the trace element groups in iron meteorites and an attempt to relate these to the nature of the parent body. Previously, Dr. Wasson has already greatly extended earlier work on the Ga-Ge groups, including the discovery of a new Ga-Ge group and jointly we will continue this work and extend it with Ni, Co, Re, and Os measurements on the same meteorites.